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RESEARCH ARTICLE

The prevalence of head and face pain decreased from 1997 to 2017 in Switzerland

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Abstract

Background: Pain in the head and the face is highly prevalent but may have changed during the past years. This study aimed to analyze changes in the prevalence of pain in the head and the face in Switzerland from 1997 to 2017.

Methods: This is a secondary analysis of data collected in the Swiss Health Surveys of 1997–2017. Included persons were 15 years and older. Besides studying demographic data, we analyze the item assessing the presence of “headache, pressure in the head, or facial pain” during the past 4 weeks. Percentages with their Wilson confidence intervals are reported for each response option of categorical variables. Moreover, we calculate the age-standardized number of persons affected by the pain.

Results: While 41% reported head and face pain in 1997, the proportion dropped to 31% in 2017. There was a decrease of 19.5% in women and 29.4% in men; after age standardization, the decrease was 16.5% in women and 25.4% in men. The most considerable numerical changes in the percentages of women with pain occurred in those aged 55–69 and 85 and above. In men, the changes were not limited to specific age groups.

Conclusions: The proportion of people reporting headaches, pressure in the head, or facial pain has dropped in Switzerland from 1997 to 2017. However, in women, the prevalence diminished more strongly and consistently in the middle-aged and the elderly than in the young.

KEY WORDS

epidemiology, headache, prevalence

INTRODUCTION

Headaches are highly prevalent. Each year, migraine and tension-type headache affect more than one billion people worldwide¹; their lifetime prevalence seems even higher.² A growing body of evidence suggests a genetic predisposition for several primary and possibly some secondary headache disorders.^{3–7} As triggers of single attacks, however, patients often identify external factors.

Migraineurs, whose attacks account for many headaches each year,¹ often recall that stress, noise, sleeping issues, or weather changes provoked their pain.^{8–10}

However, the prevalence of these factors in Switzerland has changed over the last decades.

For example, the proportion of persons bothered by traffic noise and air pollution in Switzerland increased from 2011 to 2019.¹¹ Moreover, the average temperatures and the sunshine duration rose.¹² Likewise, physical activity, which may prevent some headache types to some extent,^{13,14} increased from 2002 to 2017.¹⁵

On population level, the changing age structure likely also influences the prevalence of headaches, which are more common in the young.¹⁶ From 2002 to 2017, the proportion of people aged 65 and above rose from 15.6

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to 18.3 per cent in Switzerland.¹⁷ Thus, the prevalence of head and face pain may have changed over the years.

This study reports changes in the prevalence of pain in the head and the face in Switzerland from 1997 to 2017 and puts the findings into the perspective of the changing demography.

METHODS

This is a secondary analysis of data collected in the Swiss Health Surveys of 1997, 2002, 2007, 2012, and 2017.

Study design

Every 5 years, the Swiss Federal Statistical Office conducts a Swiss Health Survey, each designed as an individual cross-sectional study. The aim was to investigate the population's health condition and monitor possible changes. Overarching topics are physical, mental, and sexual health, social support, health and risk behavior, living and working conditions, and prevention.¹⁸

Eligible for participation are residents in Switzerland aged 15 and above. Excluded persons live in collective households, for example, monasteries, prisons, and nursing homes, or are asylum seekers.¹⁸

The Swiss Federal Statistical Office selects persons meeting these criteria based on data from the resident's registration offices. The aim was to include a sample representative of the population in Switzerland. In addition, some cantons and agglomerations may raise the number of persons included from their region to allow for a representative subsample. Moreover, the Federal Office of Public Health commissioned increasing the sample of persons with a migration background.¹⁸

Individuals who decline participation are not substituted. Instead, the number of contacted persons accommodates the expected non-responder rate.

Included persons participate in a telephone interview, later complemented by a written survey. In addition, about one percent of the participants are invited for a face-to-face interview as part of a quality control measure. In this study, we solely analyze data from telephone interviews.

Most of the questionnaires have remained unchanged over the years to ensure comparability. The Swiss Federal Statistical Office provides an in-depth methodology on its website (<https://www.bfs.admin.ch/>).¹⁸

Statistical analyses

For the sample to be representative of all residents, the Swiss Federal Statistical Office releases weightings, which we use for all analyses.¹⁸ Because of the correction, we only report percentages with their Wilson

confidence intervals (CIs) for categorical variables, not absolute numbers.

First, we describe the participation rate and demographic data, including the participants' age, sex, civil status, education level, employment level, nationality, net earnings, and urbanity. Categorical variables are reported as percentages with their 95% Wilson confidence intervals; continuous variables are reported as means with their 95% confidence intervals.

Then, we analyze the item assessing “headache, pressure in the head, or facial pain.” Participants quantify their suffering due to these types of pain during the last 4 weeks on a three-point Likert scale comprising the options “not at all,” “some,” and “much.” Again, we report the percentages with their 95% Wilson CIs for each response option of the variable.

Next, we investigate whether the changing age structure of the population explains differences in the prevalence rates. To that end, we calculate standardized prevalence rates by applying the category “headache, pressure in the head, or facial pain” of every survey to the European Standard Population.¹⁹

Finally, we report the proportions of persons reporting pain in the head and the face for different age groups. The aim was to detect changes that only affect certain age groups.

We conduct all analyses using IBM SPSS statistics version 29.

RESULTS

The participation rates in the Swiss Health Surveys were 64.4% (13,004÷20,178) in 1997, 60.0% (19,706÷32,868) in 2002, 62.2% (18,760÷30,179) in 2007, 52.7% (21,597÷41,008) in 2012, and 50.6% (22,134÷43,769) in 2017.

The following results are estimates for the total Swiss population, which we obtained using weights released by the Swiss Federal Statistical Office (see above). **Table 1** summarizes the demographic data.

First, we analyzed the item investigating the presence of “headache, pressure in the head, or facial pain” during the previous 4 weeks and estimated the percentage of people in Switzerland who chose each of the response options (**Table 2**).

The percentage of women and men who reported “some” or “much” pain dropped from 1997 to 2017 by 23.9% $\left(\frac{((32.04+8.67)-(25.30+5.66))}{(32.04+8.67)}\right)$; in women, there was a decrease of 19.5% $\left(\frac{((35.11+11.33)-(29.46+7.94))}{(35.11+11.33)}\right)$, and in men, of 29.4% $\left(\frac{((28.72+5.81)-(21.05+3.32))}{(28.72+5.81)}\right)$.

To investigate whether the changes in the percentages of persons reporting pain in the face or the head were due to the changing age structure of the population, we calculated the age-standardized prevalence per 100,000 (lumping together the categories “some” and “much”) using the European Standard Population (see **Figure 1**).¹⁹

TABLE 1 Demographic data of the Swiss Health Surveys from 1997 to 2017; please note that the surveys of 1997, 2002, and 2007 did not include the category of urbanity “intermediate”, which comprises densely populated peri-urban areas and rural centers.

Variable	Value/unit	Survey of 1997	Survey of 2002	Survey of 2007	Survey of 2012	Survey of 2017
Age	Years	45.38 (45.36–45.39)	45.74 (45.73–45.76)	45.79 (45.77–45.80)	47.44 (47.43–47.46)	47.56 (47.55–47.57)
Means and 95% CI	Man	48.09 (48.05–48.13)	48.35 (48.31–48.39)	48.84 (48.8–48.88)	49.00 (48.96–49.04)	49.40 (49.36–49.44)
	Woman	51.91 (51.87–51.95)	51.65 (51.61–51.69)	51.16 (51.12–51.2)	51.00 (50.96–51.04)	50.60 (50.56–50.64)
Percentages and 95% CI	Single	27.37 (27.34–27.41)	27.80 (27.77–27.84)	30.75 (30.71–30.78)	31.54 (31.5–31.57)	33.71 (33.67–33.74)
	Married	58.61 (58.57–58.65)	59.94 (59.9–59.98)	54.95 (54.91–54.99)	51.67 (51.64–51.71)	50.86 (50.82–50.90)
Civil status	Divorced	6.73 (6.71–6.75)	6.50 (6.48–6.52)	8.35 (8.33–8.37)	10.18 (10.15–10.20)	10.31 (10.29–10.34)
	Widowed	7.29 (7.26–7.31)	5.75 (5.73–5.77)	5.96 (5.94–5.98)	6.61 (6.60–6.63)	5.12 (5.10–5.13)
Education level	Obligatory school	25.69 (25.66–25.73)	24.01 (23.98–24.05)	22.07 (22.04–22.1)	20.49 (20.46–20.52)	18.65 (18.62–18.68)
	Secondary education	57.69 (57.65–57.73)	60.42 (60.38–60.46)	54.03 (53.99–54.07)	50.92 (50.89–50.96)	47.54 (47.5–47.57)
Percentages and 95% CI	Tertiary education	16.61 (16.58–16.64)	15.57 (15.54–15.6)	23.90 (23.87–23.94)	28.58 (28.55–28.62)	33.81 (33.78–33.85)
	Pensioned	31.37 (31.33–31.41)	31.56 (31.53–31.6)	28.35 (28.31–28.39)	30.44 (30.4–30.47)	29.91 (29.88–29.95)
Job situation	Unemployed	3.39 (3.38–3.41)	2.19 (2.17–2.2)	3.22 (3.21–3.24)	2.01 (2–2.02)	2.48 (2.47–2.49)
	Employed	65.24 (65.2–65.27)	66.25 (66.21–66.29)	68.43 (68.39–68.46)	67.55 (67.52–67.59)	67.61 (67.58–67.65)
Nationality	Swiss	81.73 (81.7–81.76)	80.55 (80.51–80.58)	79.45 (79.42–79.48)	77.02 (76.99–77.05)	75.69 (75.66–75.72)
	Foreigner	18.27 (18.24–18.3)	19.45 (19.42–19.49)	20.55 (20.52–20.58)	22.98 (22.95–23.01)	24.31 (24.28–24.34)
Net earnings	CHF / month	3610.51 (3607.86–3613.16)	3600.16 (3596.60–3603.71)	36936.93 (3933.51–3940.35)	4125.11 (4121.51–4128.70)	4239.66
	Means and 95% CI					(4235.43–4243.88)
Urbanity	Urban	69.56 (69.52–69.59)	68.34 (68.31–68.38)	73.27 (73.24–73.31)	61.72 (61.68–61.75)	62.87 (62.83–62.91)
	Rural	30.44 (30.41–30.48)	31.66 (31.62–31.69)	26.73 (26.69–26.76)	21.67 (21.64–21.7)	21.47 (21.44–21.5)
Percentages and 95% CI	Intermediate	–	–	–	16.62 (16.59–16.64)	15.66 (15.64–15.69)

Abbreviation: CI, confidence interval.

TABLE 2 Frequencies of the responses to the item investigating the presence of “headache, pressure in the head, or facial pain” during the previous 4 weeks.

	Response	1997	2002	2007	2012	2017
Women and men	None	59.29 (59.25–59.33)	63.74 (63.70–63.78)	63.77 (63.73–63.81)	67.51 (67.48–67.55)	69.04 (69.00–69.07)
	Some	32.04 (32.00–32.08)	28.41 (28.37–28.45)	28.63 (28.59–28.66)	27.32 (27.28–27.35)	25.30 (25.27–25.34)
	Much	8.67 (8.65–8.70)	7.85 (7.83–7.87)	7.60 (7.58–7.62)	5.17 (5.15–5.19)	5.66 (5.64–5.67)
Women	None	53.56 (53.50–53.62)	57.43 (57.37–57.48)	58.15 (58.09–58.2)	60.96 (60.91–61.01)	62.60 (62.55–62.65)
	Some	35.11 (35.06–35.16)	32.19 (32.14–32.24)	31.90 (31.85–31.95)	31.66 (31.61–31.71)	29.46 (29.41–29.5)
	Much	11.33 (11.29–11.37)	10.38 (10.34–10.41)	9.95 (9.92–9.99)	7.38 (7.35–7.41)	7.94 (7.92–7.97)
Men	None	65.47 (65.42–65.53)	70.48 (70.43–70.53)	69.67 (69.62–69.72)	74.34 (74.29–74.38)	75.63 (75.59–75.68)
	Some	28.72 (28.67–28.77)	24.37 (24.32–24.42)	25.20 (25.15–25.25)	22.80 (22.75–22.84)	21.05 (21.01–21.10)
	Much	5.81 (5.78–5.83)	5.15 (5.12–5.17)	5.13 (5.11–5.16)	2.87 (2.85–2.89)	3.32 (3.30–3.33)

Abbreviation: CI, confidence interval.

Please note that the reported numbers may not indicate the actual number of affected persons; instead, their purpose is to allow assessing changes between the different surveys independently of the age structure.

The age-standardized prevalence of persons with head or face pain decreased from 1997 to 2017 by 20.2% ((51,826–64,956)÷51,826). In women, the decrease was 16.5% ((31,637–37,907)÷37,907), and in men 25.4% ((20,189–27,049)÷27,049).

Thus, the decrease in the proportion of women and men with head and face pain remained roughly unchanged after age standardization (19.5% without vs. 16.5% with age standardization in women; 29.4% without vs. 25.4% with age standardization in men).

Using the age-standardized prevalence, we calculated the ratios of affected women to men for each survey. In 1997, about 1.40 times more women reported headache than men did (37,907 ÷ 27,049). The ratio increased over time reaching 1.49 in 2002 (34,582 ÷ 23,177), 1.42 in 2007 (34,053 ÷ 24,051), 1.56 in 2012 (32,662 ÷ 20,919), and 1.57 in 2017 (31,637 ÷ 20,189).

Finally, to investigate whether the observed changes occurred similarly in all age groups, we estimated the proportions of persons affected by the pain for different age groups. Figure 2 shows the estimated proportions of people in Switzerland reporting “some” or “much” “headache, pressure in the head, or facial pain” during the previous 4 weeks for different age groups. The data of women are depicted in green, and the data of men are depicted in blue. Table S1 provides the estimates, including their 95% confidence intervals.

DISCUSSION

The proportion of people in Switzerland reporting “headache, pressure in the head, or facial pain” has decreased from 1997 to 2017. The drop in the prevalence occurred in women and men but did not affect all age groups equally.

In 1997, about 40% of the population suffered from pain in the head or the face in the 4 weeks prior to the survey; in 2017, about 31% did. The proportion of people reporting “much” pain decreased in every survey, except for 2017, when the fraction fell in women but not men. Likewise, the proportion of women and men reporting “some” pain decreased in every survey, except for 2007 when the proportion dropped solely in women (see Table 2).

Studies report that older people suffer from headaches less frequently than younger people.^{20,21} Hence, the aging population (see Table 1) might account for some of the decreases in the prevalence of pain. However, even after age standardization, we detected a reduction in the proportion of people with headaches and facial pain (see Figure 1). Consequently, more than the changing age structure is needed to explain our results.

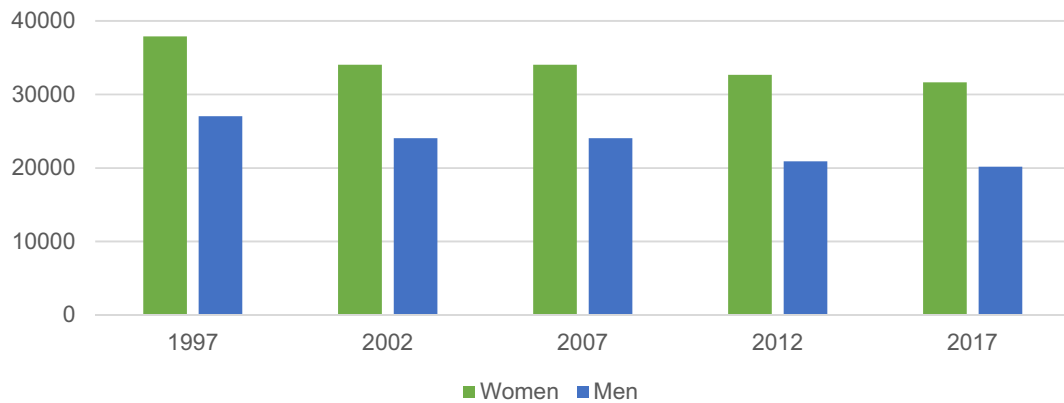


FIGURE 1 Estimated age-standardized prevalence per 100,000 of “some” or “much” “headache, pressure in the head, or facial pain” during the past 4 weeks using the European Standard Population. Please note that the indicated numbers may not reflect the actual number of affected persons; instead, they allow an age-standardized comparison of the results of different surveys.

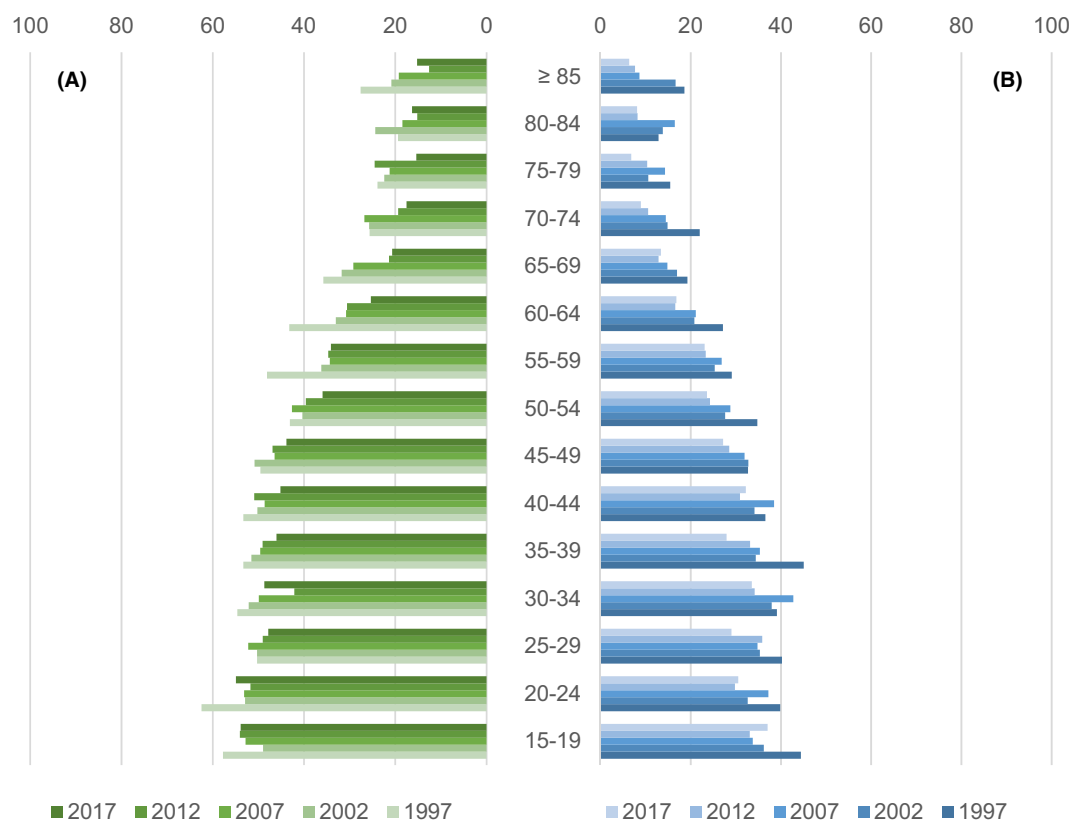


FIGURE 2 Estimated percentages of people in Switzerland reporting “some” or “much” “headache, pressure in the head, or facial pain” during the previous four weeks per age group and survey; the data of women are shown in green (A), the data of men in blue (B).

Similar to our findings, the Global Burden of Disease studies documented a reduction in the prevalence of migraine and tension-type headache in countries with a high Socio-demographic Index in general and Switzerland in particular.¹ However, according to their estimates, Switzerland's age-standardized rates of migraine and tension-type headache dropped by 1.3% and 1.5%, respectively. Thus, the changes in the prevalence of pain reported in our study vastly exceed these estimates.

The questionnaires used for the Swiss Health Surveys do not distinguish different headache types but lump together headache and facial pain. Thus, methodological differences could explain the differing results. For instance, the prevalence of other types of headaches and facial pain could have decreased more strongly than that of migraine and tension-type headache. Alternatively, fewer persons might have received a headache diagnosis in 1997 than in 2017. Thus, an increasing number of diagnosed migraine and tension-type headaches might

have counterbalanced the overall decreasing number of headaches.

To obtain a more detailed understanding of the prevalence of head and facial pain and its changes, we calculated the proportions of women and men and different age groups separately (see [Figure 2](#) and [Table S1](#)).

All surveys reported the highest proportion of women with pain between the ages of 20–24. Among men, the highest proportion lay in different age groups between 15 and 39 years. On the other hand, the oldest participants generally had the highest proportion of pain-free persons in both sexes. The proportion of women affected by head and face was higher in every survey. These findings are in line with previous studies assessing the prevalence of headaches.^{20,21}

Visual inspection suggests a relatively steady decrease in the proportion of persons with pain starting at the age group of 45–49 in women and 40–44 in men, which attenuates in both sexes at a higher age (about 75 onwards) in all surveys. These findings second previous studies and suggest that biological factors engender lower pain prevalence at a higher age.^{20,21}

The percentage decreases in women and men reporting headaches in 2017 compared with 1997 were somewhat higher when calculated without age standardization. Thus, the number of men and women in age groups with a lower headache frequency likely increased during that period. Given the lower headache prevalence in older age (see [Figure 2](#)), this finding is consistent with an aging population.

The most considerable numerical changes in the proportions of women with pain from 1997 to 2017 occurred in those aged 55–69 and, to a lesser extent, in those aged 85 and above (see [Table S1](#) and [Figure 2](#)). Conversely, minor changes appear in younger women, especially those aged 25–29. In men, on the other hand, the changes occurred in several different age groups. Consequently, while men of most age groups benefitted from the decrease in pain prevalence, in women, the effect centered on the post-menopausal period.

Changes in the results of the surveys from 1997 to 2017 are unlikely due to internal, that is, biological and genetic factors, as these probably change slowly.²² Thus, we suspect that external factors, particularly the standard of living in 2017 allowed more people a pain-free life than in 1997.

Age groups in which the percentage of persons dropped from *each* survey to the next can be detected in [Figure 2](#); they show a bar pattern somewhat resembling a pan flute. In women aged 60–69 and 35–39, we find a clear “pan flute pattern”; in men, it solely appeared in those aged 70–74 and 85 and above.

Such a “pan flute pattern” implies that improvements occurred consistently and reached most persons with head and facial pain in the respective age group. Thus, in these groups, headache prevalence might depend predominantly on external factors that similarly affect

everybody and—unlike hormonal influences—changed favorably from 1997 to 2017. Conversely, it suggests itself that pain prevalence in the age groups that changed little depends more on internal factors, for example genetic or hormonal influences or external factors that remained stable.

The demographic data in [Table 1](#) document some of society's transformations from 1997 to 2017. For instance, the percentage of people with tertiary education increased, while the percentage of persons who stopped their education after obligatory school decreased. Moreover, the unemployment rate dropped, and net earnings increased.

Further analyses report that the number of suicides per 100,000 and year dropped from 17.1 to 10.4, and the number of physicians per 100,000 increased from 1.8 to 2.2 from 1997 to 2017.²³ Besides, the life expectancy increased from 81.1 and 76.3 to 85.4 and 81.4 years for women and men, respectively, in that period.²³ However, the self-perceived health condition has remained stable in people aged 75 years and above.²⁴ Besides, concerns about traffic noise and air pollution grew.¹¹ Nevertheless, several aspects of life improved.

It seems unlikely that advancements in the pharmacological treatment options or the healthcare system drove the changes in the pain prevalence. The two drug classes that considerably impacted headache treatment, triptans and monoclonal antibodies directed against calcitonin gene-related peptide or its receptors, were licensed before and after the study period, respectively.^{25,26}

The extent to which these factors influence the prevalence of head and face pain is currently unknown. Thus, further in-depth analyses will be necessary to quantify their impact on the observed changes in the prevalence of pain in the head or the face. Specifically, if external factors have positively influenced the pain prevalence in certain age groups, internal, that is, biological factors might have prevented the others from benefitting. In other words, if the headache prevalence has remained unchanged in all age groups despite being part of the same society, biological factors may have averted changes.

Strengths and limitations

The strengths of this study are the quality of the data, the extensive samples, and the reasoned sampling strategy. Moreover, the standardized data collection with largely unchanged methodology from 1997 and 2017 allows analyzing the Swiss population's health condition and monitor possible changes.

There are some limitations. First, many invited persons did not participate. However, as the sampling plan accommodates dropouts, the unit non-response error is likely small.

Second, the item assessing the presence of headache did not guide the distinction between “some” and

“much” pain. Hence, the borderlines between the options appear imprecisely defined. Therefore, we focused the second part of our analyses on the differences between the presence and absence of pain.

Furthermore, the item assessing “headache, pressure in the head and facial pain” lumps together disparate entities with different therapeutic approaches, different burdens of disease, and different prognoses. Hence, an in-depth questionnaire would have been necessary to understand the observed changes better and to differentiate different pain disorders.

Finally, assessing a symptom with one question alone gives space to a random error that may have impaired our conclusions.

CONCLUSION

The proportion of people aged 15 and above reporting headaches, pressure in the head, or facial pain has dropped in Switzerland from 1997 to 2017. The increasing average age of the population cannot explain the finding because even after age standardization, there was a reduction in the proportion of people with headaches and facial pain.

Headache prevalence did not drop uniformly in all age groups. While it decreased in both women and men, in women, the prevalence diminished more strongly and consistently in the middle-aged and the elderly than in the young.

Pain in the head and the face likely depends on intrinsic factors, for example, hormonal and genetic influences, and extrinsic factors, for example, stress and life quality. Thus, a possible explanation for our findings is that the relative effect of the latter increases with age; at the same time, the former seem to loosen their grip on both women and men during life.

It suggests itself that living conditions in Switzerland have evolved advantageously for persons with pain in the face and the head. However, more research is necessary to identify relevant influencing factors and quantify their weight.

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CONFLICT OF INTEREST STATEMENT

The authors report no conflict of interest relevant to this work.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from Swiss Federal Statistical Office. Restrictions apply to the availability of these data, which were used under license for this study.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Table S1.

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